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MICHIGAN

AGRICULTURAL EXPERIMENT STATION

STATE AGRICULTURAL COLLEGE.

FARM DEPARTMENT.

POTATOES

Hills vs. Drills
Shallow vs. Deep Culture
Different Depths of Planting
Mulching vs. Cultivation
Comparison of Varieties

BY P. M. HARWOOD.

The Bulletins of this Station will be sent free to all newspapers in the State, and to such individuals interested in farming as may request it. Address all applications to the Secretary, Agricultural College, Michigan.

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INTRODUCTION.

The object of this bulletin is to give the results of the experiments with potatoes thus far conducted by the agricultural department of this station.

By a recent vote of the Board of Agricuture potato experiments will be confined hereafter to the horticultural department.

It is to be understood that the results here found are not to be taken as entirely conclusive; the experiments have not been conducted long enough for that.

This is a report of progress, and this bulletin is intended to give the results of single, carefully conducted experiments.

Much credit is due Mr. P. G. Holden, who has been connected with all the potato experiments in this department from the beginning, as well as to the young men whose names appear with their respective experiments, and to Mr. L. J. Briggs for valuable assistance in rearranging the tables for this bulletin.

HILLS VS. DRILLS.

BY C. J. BARNUM, '94, AND W. J. McGEE, '96.

The object of the experiment was to ascertain, if possible, which method of planting, in hills or in drills, gives the greater yield per acre.

The potatoes were planted May 31, 1892, each potato being cut in four pieces. Equal amounts of seed were used for equal areas, *i. e.*, the same amount of seed was used for an acre of hills as for an acre of drills.

The test was made with several varieties in order that each individual variety might not influence materially the general result. The various plats of hills and drills alternated with each other, securing as nearly uniform conditions as possible.

The following table gives in bushels per acre the general average resulting from 24 experiments:

TABLE 1.—*Comparative yields.*

Variety.	Drills.—Bu.	Hills.—Bu.
Early Ohio	207	195
Rural New Yorker No. 2	310	281

With the Early Ohio, out of a total of 12 experiments, 6 were in favor of hills, 5 in favor of drills and one experiment was indecisive.

With the Rural New Yorker No. 2, 9 out of 12 experiments favored the method of drills and three were in favor of hills.

Four other experiments were made with other varieties, 3 of which showed a balance in favor of drills while one gave the greater yield with the hill culture.

Thus we see out of a total of 28 experiments, 10 were in favor of hill culture and 17 in favor of drills. The general average, however, as shown by the above table, was in favor of drills.

Experiments along the same line were conducted by E. B. Hale during 1891. These experiments were quite extensive, being made with four different amounts of seed and each experiment was repeated three times to secure uniform and reliable results. Two varieties were used in this experiment and the result of the work is shown in the following table:

TABLE 2.—*Comparative yields.*

Variety.	Hills.—Lbs.				Drills.—Lbs.			
	One eye.	Two eyes.	One-half potato.	Whole potato.	One eye.	Two eyes.	One-half potato.	Whole potato.
Rural New Yorker No. 2	162	198	187	182	181	210	199	213
Pearl of Savoy	38	46	66	112	70	81	94	136

The numbers given in the preceding tables show that the yield was, in every instance, appreciably in favor of the method of drills. This experiment may be regarded as quite conclusive, as each number in the table is an average of four distinct experiments, and therefore the grand totals show the result of 32 comparisons. These experiments were conducted on both clay and sand, the results in both cases favoring drills. The size of each plat was two square rods.

SHALLOW VS. DEEP CULTURE

AND

THE COMPARATIVE RESULTS OF DIFFERENT DEPTHS OF PLANTING.

BY G. MASSELINK AND W. C. BAGLEY (CLASS OF '95), 1892.

The objects of the experiment were (1), to test the relative merits of deep and shallow culture, and (2), to secure comparative results of the different depths of planting.

The plat on which the experiments were conducted is a sandy loam. The ground slopes gently towards the west, and presented for the experiment as nearly uniform conditions as could be obtained.

The planting was commenced June 11, and was completed June 14. Three varieties of potatoes were used, namely, Burbank's seedling, Lee's Favorite, and Thorburn, in order that the eccentricity of any particular variety might be guarded against as influencing the entire experiment.

The potatoes were planted at the depth of two, three, four, five and six inches. The cultivation was performed with a "Goodyear" cultivator, set at about one and one-half inches for the shallow culture, and at about five inches for the deep culture.

There was little difference in time of appearance between those planted two, three, four and five inches deep. In nearly all cases the three and four inch plants were a trifle more advanced than the two and five.

In ripening, little difference was noted between those planted six and five inches deep, either in point of advancement or in time of ripening. Those planted two and three inches deep were very slightly farther advanced than the others.

TABLE 3.—*Graphic illustration of yield per acre.*

(Scale: 60 bushels per ½ inch.)

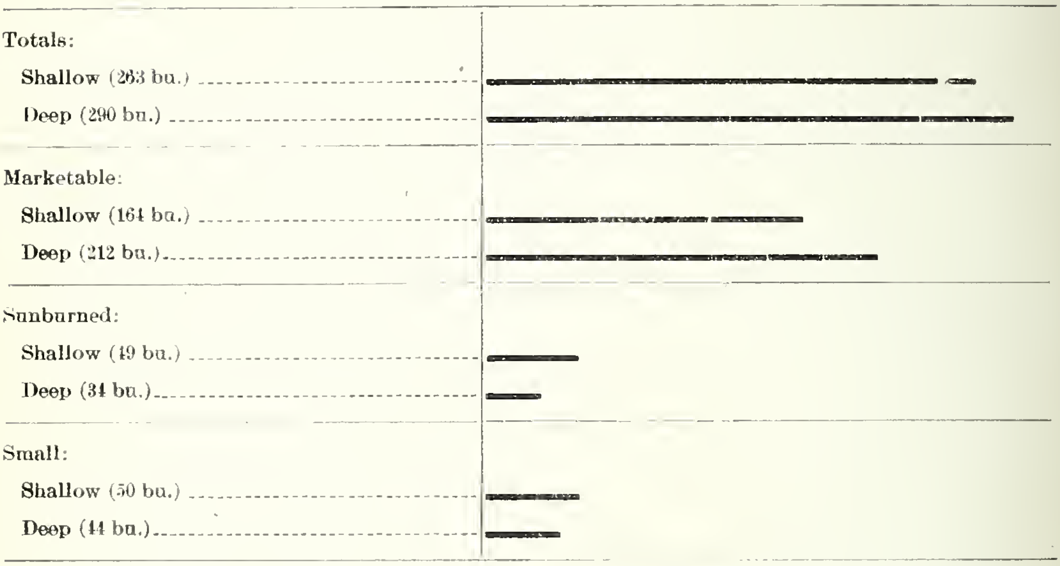


TABLE 4.—*Different depths of planting; graphic illustration of yield per acre.*

(Scale: 60 bushels per ½ inch.)

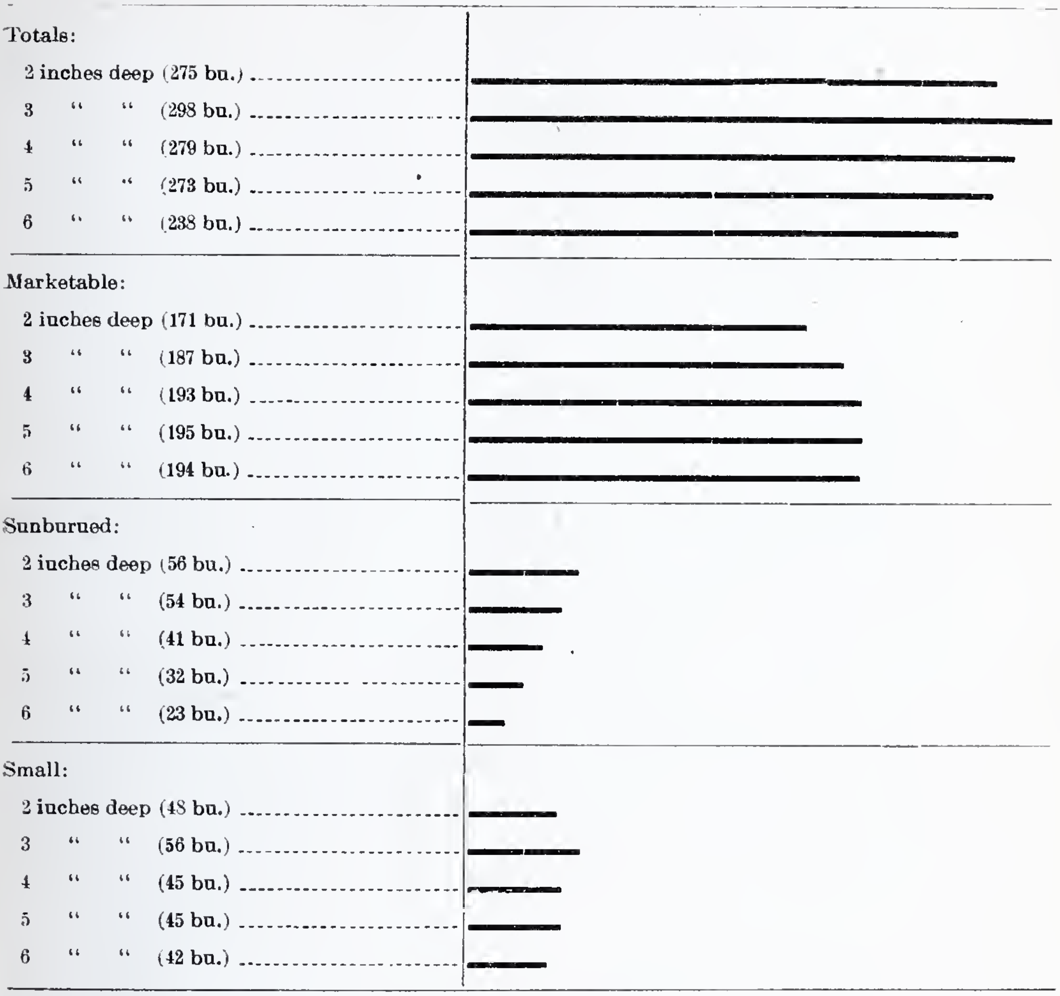


TABLE 5.—*Table of comparisons.*

Varieties.	Shallow culture.				Deep culture.			
	Totals.	Marketable.	Sunburned.	Small.	Totals.	Marketable.	Sunburned.	Small.
Burbank's seedling	1,386	930	293	163	1,529	1,189	188	152
Lee's Favorite	1,409	835	270	285	1,578	1,124	208	246
Thorburn	1,643	996	266	381	1,783	1,264	161	348
Totals	4,438	2,761	829	829	4,890	3,577	557	746

LEE'S FAVORITE.

TABLE 6.—*Comparative yields.*

	Shallow.				Deep.				Shallow.				Deep.				Shallow.				Deep.				Totals.	
Total	100				85				62				75				54				91				467	2 inches deep.
Marketable		41				67				23				37				23				56			247	
Sunburned			30				5				23				21				17				17		113	
Small				29				13				16				17				14				18	107	
Total	105				104				77				81				84				147				598	3 inches deep.
Marketable		46				78				40				48				48				93			353	
Sunburned			30				11				16				16				20				30		123	
Small				29				15				21				17				16				24	122	
Total	93				107				79				69				119				154				621	4 inches deep.
Marketable		60				83				47				47				63				112			412	
Sunburned			13				7				14				10				28				24		96	
Small				20				17				18				12				28				18	113	
Total	113				92				88				88				140				163				684	5 inches deep.
Marketable		75				71				56				63				95				122			482	
Sunburned			17				7				11				8				23				22		88	
Small				21				14				2				17				22				19	95	
Total	87				85				86				102				122				135				617	6 inches deep.
Marketable		66				67				62				80				90				100			465	
Sunburned			6				5				7				7				15				18		58	
Small				15				13				17				15				17				17	94	
Grand totals	498	288	96	114	473	366	35	72	392	228	71	74	415	275	62	78	519	319	103	97	690	483	111	96	5955	

BURBANK'S SEEDLING.

TABLE 7.—*Comparative yields.*

	Shallow.				Deep.				Shallow.				Deep.				Shallow.				Deep.				Totals.	
Total	130				112				112				125				119				110				708	2 inches deep.
Marketable		81				88				69				92				82				83			495	
Sunburned			35				15				23				22				29				10		134	
Small				14				9				20				11				8				17	79	
Total	127				94				98				117				86				113				635	3 inches deep.
Marketable		82				72				65				93				42				79			433	
Sunburned			32				11				20				16				27				20		126	
Small				13				11				13				8				17				14	76	
Total	125				93				80				110				69				105				582	4 inches deep.
Marketable		88				70				54				90				42				77			421	
Sunburned			24				12				17				13				18				16		100	
Small				13				11				9				7				9				12	61	
Total	111				111				64				100				43				74				503	5 inches deep.
Marketable		85				87				44				76				29				54			375	
Sunburned			15				17				10				8				8				11		69	
Small				11				7				10				16				6				9	59	
Total	102				106				92				95				28				64				487	6 inches deep.
Marketable		87				91				60				79				20				58			395	
Sunburned			8				7				22				7				5				3		52	
Small				7				8				10				9				3				3	40	
Grand totals	595	423	114	58	516	408	62	46	446	292	92	62	547	430	66	51	345	215	87	43	466	351	60	55	5832	

THORBURN.

TABLE 8.—*Comparative yields.*

	Shallow.				Deep.				Shallow.				Deep.				Shallow.				Deep.				Totals.	
Total	105				100				110				122				138				109				684	2 inches deep.
Marketable		66				80				55				75				66				72			414	
Sunburned			10				5				32				16				50				18		131	
Small				29				15				23				31				22				19	139	
Total	115				122				112				102				148				172				771	3 inches deep.
Marketable		78				86				56				80				79				96			475	
Sunburned			9				9				24				9				34				30		115	
Small				28				27				32				13				35				46	181	
Total	95				102				86				107				151				138				679	4 inches deep.
Marketable		79			9	5				47				83				98				99			465	
Sunburned			4				10				16				8				25				21		84	
Small				12				33				23				16				28				18	130	
Total	84				109				89				98				125				150				655	5 inches deep.
Marketable		57				68				45				80				88				123			461	
Sunburned			6				10				17				3				14				1		51	
Small				21				31				27				15				23				16	133	
Total	62				100				111				99				112				153				637	6 inches deep.
Marketable		36				59				59				87				87				117			445	
Sunburned			6				9				15				3				4				9		46	
Small				20				32				37				9				21				27	146	
Grand totals	461	316	35	110	533	352	43	138	508	262	104	142	528	405	39	84	674	418	127	129	722	507	79	126	6830	

From the preceding tables it will be seen that out of 45 experiments, the total yield in 29 cases was greatest with the deep culture, and in 13 cases was in favor of shallow culture, while in 3 instances the yield was practically the same.

In the same experiments the yield of marketable potatoes was in 40 cases in favor of deep culture, while four cases showed a balance in favor of shallow culture. The amount of sunburned potatoes was in 36 cases greatest in shallow culture, in 6 cases in favor of deep culture, while in three instances the yield was the same. The amount of small potatoes was in 28 cases greatest with shallow culture, in 15 cases greatest with deep culture, while 2 instances were indecisive.

The above figures show that deep culture gives the best result both as to total yield, and as to percentage of marketable to unmarketable. This holds true for all the different kinds of soil on the plat.

In the same tables, it will be found that the potatoes planted 3 inches deep gave the largest yield, and that those planted 5 inches deep gave the largest amount of marketable potatoes. The potatoes planted 2 inches deep gave the smallest amount of marketable potatoes.

MULCHING VS. CULTIVATION.

BY E. M. McELROY (Class of '93), 1891.

The object of this experiment was to show the yield of potatoes grown under a mulch, as compared with mulching in the hill, and also with the ordinary method of cultivation.

The potatoes were planted 33 inches apart each way. The plat was $2\frac{1}{3}$ rods wide and 16 rods long. This was divided lengthwise into 3 divisions, and crosswise into 8 plats, thus making 48 hills in each plat. Different amounts of seeds were used in the different plats, which accounts for the difference in the totals. But the same amount of seed was used for each division in any one plat. All the plats were planted with Burbank's Seedling on June 12 and all the potatoes were planted at a depth of 3 inches.

There was no difference in time of appearance between the unmulched potatoes and those covered with a mulch, while the potatoes planted with straw in the hill did not make their appearance until two days later.

The quality of the potatoes grown under the mulch was excellent. They were almost entirely free from scab. The unmulched potatoes were badly affected with scab, and although the yield was the heaviest, the quality was inferior. On the division where the straw was placed in the hill, the quality was poor and nearly every potato was affected with scab.

In comparing the results obtained, we must take into account the different amounts of work put upon different divisions. If the straw is taken from an exposed stack and is free from seed there is no work upon a mulched plat except planting, mulching and digging.

The conclusions drawn from this experiment, taking into consideration the cost of production and the quality of the yield, is that a person would be repaid in covering his potatoes with straw, especially if the season is dry

TABLE 9.—*Comparative yields.*

	Total of Div.	Div. A. Mulched.	Div. B. Un-mulched.	Div. C. Mulched in hill.
Plat 4.				
Pounds marketable	274	86	95	93
" unmarketable	41½	10	12½	19
Plat 3.				
Pounds marketable	257½	80½	90¼	86¾
" unmarketable	50¾	19¾	17½	13½
Plat 2.				
Pounds marketable	252½	72	94½	86
" unmarketable	27¼	8¾	9	9½
Plat 1.				
Pounds marketable	128½	35¾	50	42¾
" unmarketable	8¼	2¾	2¾	2¾
Plat 4.				
Pounds marketable	273¾	86	97¾	90
" unmarketable	46	13	15	18
Plat 3.				
Pounds marketable	258½	74	95½	89
" unmarketable	40	11½	20½	8
Plat 2.				
Pounds marketable	228½	53	91½	84
" unmarketable	34	5	12½	16½
Plat 1.				
Pounds marketable	106½	21½	43	42
" unmarketable	20	10½	5½	4
Total of pounds marketable		508¾	657½	613½
" " " unmarketable		81¼	95¼	91¼
Per cent marketable		84¼%	87½%	89%
Bushels per acre		112.9	168.3	155.2

EXPERIMENT CONDUCTED BY D. D. McARTHUR (Class of '94), 1892.

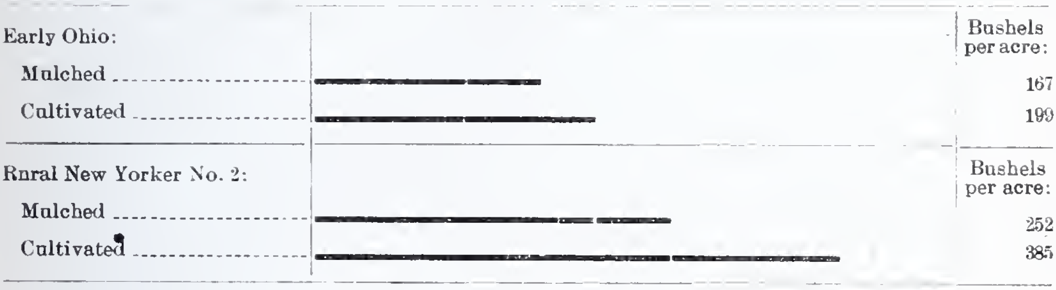
The object of this experiment was to ascertain which is the more profitable method of raising potatoes, by mulching or by cultivation. The soil was a light sandy loam, and was put in good condition preparatory to planting. The potatoes were quartered and were planted two pieces in a hill, at a depth of about four inches, the hills being thirty-three inches apart each way. Two varieties were used, the Early Ohio and the Rural New Yorker No. 2.

Plats A and B, each containing seven rows sixteen rods long, were planted with Rural New Yorker No. 2. Amount of seed used 160 lbs., or at the rate of 13⅓ bushels per acre.

Plats C and D were planted with Early Ohio, each plat containing seven rows sixteen rods long. Amount of seed used was 116 lbs., or at the rate of 9⅔ bushels per acre.

On June 10, plats B and C were covered with oat straw to a depth of 6 to 8 inches. This straw, however, was not free from grain, and oats came up thickly on 75 per cent of the plats. Unfortunately for the experiment, this did much to prevent the proper development of the vines, and this fact should be kept in mind while comparing the results given below.

Table 10.—*Comparative yields.*



EARLY OHIO.

Table 11.—*Table of profits.*

Mulched:	Dr.	Cr.
To plowing, harrowing seed and planting, $12.00; to 2 men and team 18¾ hours at 37½c, mulching, $7.03; to 1 man 5½ days at $1.25, digging, $6.87½	$25 90½	
By 132 bu. marketable potatoes at 50c. per bu.		$66 00
To balance	40 09½	
	$66 00	$66 00

Cultivated:	Dr.	Cr.
To plowing, harrowing seed and planting, $12.00; to man and horse cultivating 1½ days at $1.88, $2.82; to man and horse hilling ½ day, 94c.; to 1 man digging 3 3-10 days at $1.25, $4.13	$19 89	
By 148¼ bu. marketable potatoes at 50c. per bu.		$72 12
To balance	52 23	
	$72 12	$72 12

RURAL NEW YORKER NO. 2.

TABLE 12.—*Table of profits.*

Mulched:	Dr.	Cr.
To plowing, harrowing, seed and planting, $12.00; to 2 men and team 18¾ hours mulching at 37½c, $7.03; to 1 man 8 days digging at $1.25 per day, $10.00	$29 03	
By 215 bu. marketable at 50c		$107 50
To balance	78 47	
	$107 50	$107 50

Cultivated:	Dr.	Cr.
To plowing, harrowing, seed and planting, $12.00; to man and horse cultivating 1½ days at $1.88, $2.82; to man and horse hilling ½ day at $1.88, 94c; to man digging 6.4 days at $1.25, $8.00	$23 76	
By 223 bu. marketable at 50c		$111 50
To balance	87 74	
	$111 50	$111 50

During the summer of 1892 there was a large amount of rain; consequently, the cultivated plats did not suffer from drouth.

In a dry season it is very probable that the results would be changed quite materially in favor of mulching.

Mulching will probably never be practicable to a large extent, and when straw is scarce, not at all. The arguments in its favor are: 1st. In a dry season, the mulch, by retaining moisture would undoubtedly increase the yield of the crop; and 2d. By choking out the small weeds, and by keeping the ground moist, it does away with cultivation. Its objectionable features are: 1st. The increased amount of labor required to apply the mulch; and 2d. The increased amount of labor required to harvest the crop.

Caution.—Be sure that the straw has been thoroughly exposed to the weather, in order that all the grain or seeds that it contains may be sprouted before applying it to the land, or the foul matter will grow and ruin the crop.

COMPARISON OF VARIETIES.

BY O. S. GRONER '94.

The object of this experiment was to test the comparative yields and the per cent of marketable potatoes of forty-nine varieties, each variety was planted on June 1, 1892, in rows 33 inches apart each way, and from 4 to 5 inches deep. The soil was a light sand. Two pieces were put in each hill, each piece containing two eyes, making four eyes in a hill. The potatoes were planted in plats one rod square, each plat containing thirty-six hills. The following tables give the yield in pounds of each plat, the percent of marketable potatoes and the computed yield per acre. A graphical illustration of the comparative yield of the various varieties is also given, on a scale of 60 pounds to the inch.

TABLE 13.—*Comparative yields.*

Varieties.	Pounds in plat.	Per cent of marketable potatoes.	Bushels per acre.
Alexander's Prolific	97	95½	258
American Giant	102	98	272
Brownell's Banner	87	93½	232
Burbank's Seedling	67½	95½	180
Beauty of Hebron	62	87	165
Bannock	91	95½	242
Crown Jewell	57	96	152
Chicago Market	82½	95	220
Chas. Downing	61	79 3-5	163
Clark No. 1	67	92½	179
Delaware	88	97½	238
Dakota	73	96½	195
Early Ohio	55¾	98	149
Early Mayflower	57	95½	152
Early Sunrise	52	88½	139

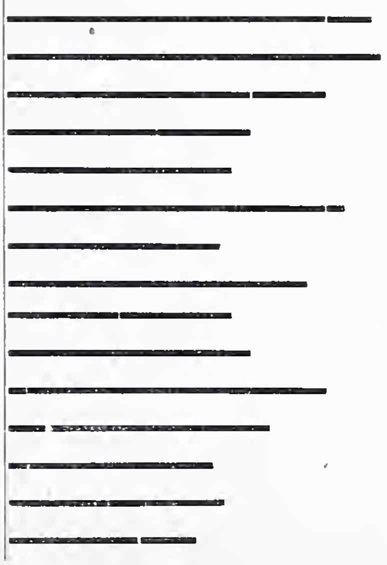
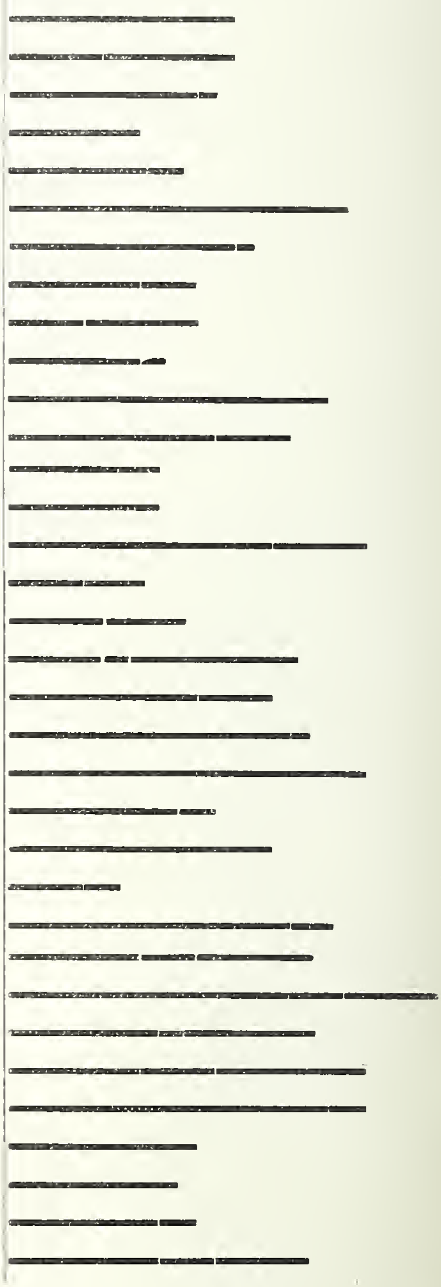


TABLE 13.—*Continued.*

Varieties.	Pounds in plat.	Per cent of marketable potatoes.	Bushels per acre.
Early Maine	64	89	171
Early Albino	62½	90	167
Early Telephone	60½	90	161
Extra Keeper	36	95	96
Empire State	51½	95	137
Garfield	97	93⅔	259
Green Monntain	69½	93	185
June Eating	54¾	90	146
Lee's Favorite	56	93	149
Monroe Seedling	44	90	117
Mammoth Pearl	83	90	228
New Badger State	73	93	195
New Queen	41	87½	109
Ohio Junior	42½	94	113
President Lincoln	98	89 3-5	261
Pearl of Savoy	36	90	96
Pringle's No. 5	49½	88½	131
Puritan	79½	94	212
Polaris	69	87	184
Putnam's Beauty	81	96	216
Peach Blow	96	94½	256
Queen of the Valley	54½	95½	145
Rural N. Yorker No. 2	69	94½	184
Rochester Favorite	31½	90	81
Red Star	88½	96½	236
Seneca Beauty	81	95½	216
Snmmit	114	95⅔	304
Snperior	81½	----------	217
Thorburn	96½	96	254
Thresher's Seedling	97½	96½	260
Vick's Extra Early	54	81⅓	144
White Star	48	89½	128
Watson's Seedling	52	90	138
White Elephant	84½	94½	225



In 1891, E. B. Hale (class of '93) conducted a similar experiment, testing 45 varieties, some of which were included in Mr. Groner's experiment the next season. The following table gives the result of his experiment. The graphical portion of the table is compiled on the same scale as that of the previous table, *i. e.*, 60 pounds to the inch.

TABLE 14.—*Comparative yields.*

Variety.	Yield of plat in pounds.	Per cent of marketable potatoes.	Bushels per acre.
White Star	73	94	195
White Elephant	73	97	195
Watson's Seedling	64½	90	172
Delaware	108½	94	289
Vick's Extra Early	61	70	162
Thorburn	60	75	160
Seneca Beauty	30	93	80
Rural New-Y'k'r No. 2	110	96	293
Rochester Favorite	90	94	240
Puritan	64	83	171
Polaris	51	82	136
Pearl of Savoy	60	83	160
New Badger State	86	96	229
Monroe Seedling	88	88	235
Mammoth Pearl	88	88	235
Red Star	76	90	202
Green Mountain	85^{2}	92	228
Garfield	83^{2}	90	223
Early Mayflower	61	90	162
Early Albino	57	84	152
Brownell's Banner	97	96	259
Early Telephone	58½	69	156
Early Maine	50	90	133
Empire State	47	91	125
Bannock	102	95	272
Chicago Market	71	94	189
Clark's No. 1	65	94	173
Burbank Seedling	87	91	232
Beauty of Hebron	60	91	160
American Giant	76	97	202
Alexander Prolific	96	94	256

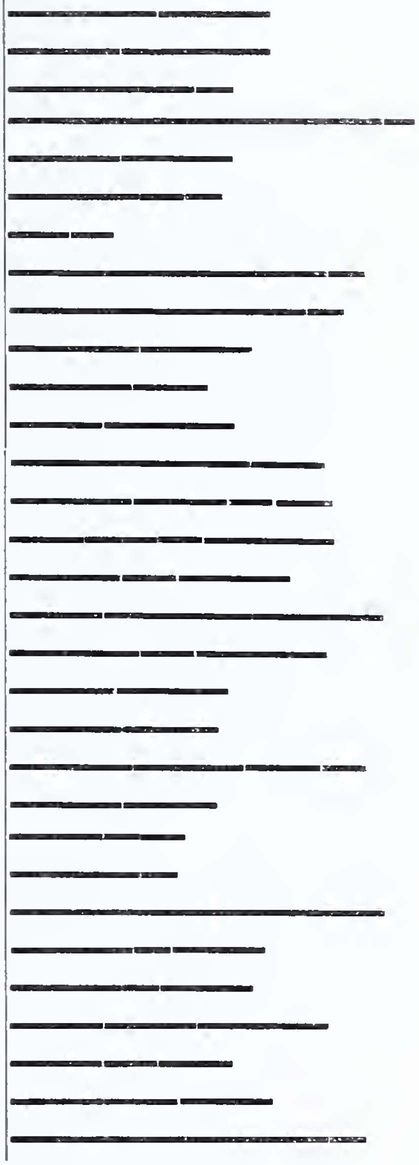
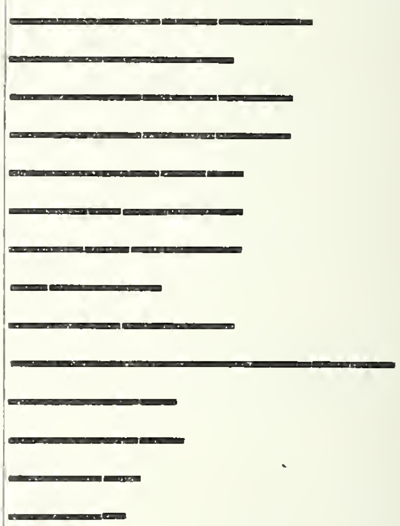


TABLE 14.—*Continued.*

Variety.	Yield of plat in pounds.	Per cent of marketable potatoes.	Bushels per acre.
Thresher's Seedling	82	92	219
Superior	62	90	165
Summit	67	94	179
Putman's Beauty	76	89	203
Crown Jewel	62	73	165
Queen of the Valley	58	91	155
Ohio Junior	57½	79	153
Early Sunrise	39	72	104
Pringle's No. 5	60	90	160
President Lincoln	105	92	280
Chas. Downing	46[2]	------------	124
June Eating	48	67	128
Extra Keeper	36	61	96
New Queen	33	73	88



It must be borne in mind that, although these experiments were carefully conducted and are indicative of certain facts, yet we are by no means justified in saying that certain varieties are far superior to others, although the experiments of the two seasons tend to prove it. A variety flourishing under other conditions of soil and climate might, and undoubtedly would, give far different results with different environments.